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**Japan's Value Added Market:
Wood Product Attributes and Competition**
Attribute Analysis: Wood Structural Members

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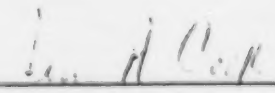
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Executive Summary

General Results

- ⊛ Approximately 170 small builders provided information for this report. They primarily construct single family detached houses and operate in one of the three large metropolitan areas of Japan (Tokyo, Nagoya and Osaka).
- ⊛ Approximately 130 pre-cutters provided information for this report.
- ⊛ Over the next 3 years small house builders expect:
 - ◆ Traditional post and beam construction to decline dramatically (49%), 2 by 4 to increase substantially (28%), hybrid houses to increase dramatically (154%), steel and concrete to increase slightly (<6%), and prefabricated houses to decline slightly.
- ⊛ Over the next 3 years pre-cutters expect:
 - ◆ Traditional post and beam construction to decline slightly (2%), 2 by 4 to increase slightly (1%), hybrid houses to increase (3%), and steel, concrete and prefabricated houses to decrease slightly (<2%).
- ⊛ Builders and pre-cutters prefer to build post and beam houses in the traditional manner even if paneling is required.
- ⊛ Both builders and pre-cutters are very aware of the growing concern with formaldehyde emissions. Slightly less than half of each group is willing to pay a small premium for a panel with emission less than current standards allowed.
- ⊛ Builders and pre-cutters prefer dry solid wood followed by engineered wood products, and lastly green solid wood for both vertical and horizontal member with green wood far behind the other two.

	Builders' Rank	Pre-cutters' Rank
strength	1	1
price	2	N/A
utility	3	5
species	4	7
colour	5	11
treatability	6	10
finish	7	N/A
dry versus green	N/A	2
sizes	10	3
durability	8	6

- ⊗ There are distinct differences between builders and pre-cutters in considering what attributes are most important
 - ◆ Both consider strength and price as the two most important (pre-cutters data from trade-off analysis).
 - ◆ Pre-cutters rank utility higher than builders while builders rank species higher than pre-cutters.
 - ◆ Size and whether the material is dry or green are much more important to pre-cutters than builders.
 - ◆ Neither group consider country of origin or distributor as very important attributes.
- ⊗ Builders prefer a mix of metal connectors and notches, followed by metal connectors and notching in the factory with notching on site the least favoured connection method.
- ⊗ Pre-cutters prefer structural members to be notched in the factory followed by metal connectors and lastly a mix of metal and notches.
- ⊗ Both builders and pre-cutter are very price sensitive and resist paying premiums for most attributes.
- ⊗ Both groups prefer Japanese sugi. However builders select Hemlock second closely followed by Scandinavian white wood and SPF. This indicates that European white wood has more market share to capture and could become equivalent to Hemlock in sales to builders.
 - ◆ Pre-cutters select Scandinavian white wood as their second choice followed by SPF and lastly Hemlock with less than 20%..
- ⊗ Strength is the highest ranked attribute for both groups.
 - ◆ Preference by both builders and pre-cutters is for slight strength increases relative to current codes but few are willing to pay a premium for increased strength.
- ⊗ Size availability is irrelevant to both groups.
- ⊗ Builders and consumers are very price sensitive with no indication of willingness to pay premiums for any attribute.
 - ◆ A small premium is available for health related attributes.
 - ◆ SPF has the best chance of attaining a price premium.
 - ◆ Hemlock and Scandinavian white wood have the least chance of attaining a price premium.

Opportunities for Wood Structural Members

✱ There are two clear opportunities:

- ◆ The first is to develop a premium SPF product for structural members in traditional post and beam construction. This could not capture a large price premium but could capture market share as long as increased costs did not prohibit its development.
- ◆ The second is to develop a dry solid wood structural member from Hemlock. This is not a new idea but it must be accomplished without requiring substantial price premiums.



Table of Contents

1	Introduction	1
2	Response to Questionnaire.....	2
2.1	Builders and House Construction	2
2.2	Pre-cutters and House Construction	3
2.3	Health Issues.....	5
2.3.1	Builders and Health Issues	5
2.3.2	Pre-cutters and Health Issues	5
2.4	Answers to Questionnaire on Wood Structural Members	6
2.4.1	Builders	6
2.4.2	Pre-cutters	8
3	Trade-Off Analysis: Wood Structural Members.....	10
3.1	Trade-Off Analysis for Builders.....	11
3.1.1	Simple Trade-Offs.....	11
3.1.2	Two Way Trade-Offs: Builders	12
3.2	Trade-Off Analysis for Pre-cutters.....	13
3.2.1	Simple Trade-Offs.....	13
3.2.2	Two Way Trade-Offs	14
4	Market Simulation.....	15
4.1	Builders and Wood Structural Members	15
4.2	Pre-cutters and Wood Structural Members	16
4.2	Further Market Share Analysis.....	17
5	Results.....	18
5.1	Summary of Key Results.....	18
5.2	Opportunities.....	20
	Appendix 1: Wood Structural Members Survey Questions.....	21

List of Figures

Figure 1: Preference for Construction Methods and the Use of Exterior Panels	3
Figure 2: Preference for Construction Methods and the Use of Exterior Panels (Pre-cutters)	5
Figure 3: Builders Preference for Material in Wood Structural Members.....	7
Figure 4: Builders' Preference for Type and Location of Connections	7
Figure 5: Pre-cutters' Preference for Material in Wood Structural Members.....	9
Figure 6: Pre-cutters' Preference for Type and Location of Connections	9

List of Tables

Table 1: Product Groups and Interview Groups	1
Table 2: Average Number of Houses Built by Construction Method.....	2
Table 3: Size of Pre-cutters Interviewed.....	3
Table 4: Builders' Most Important Attributes for Wood Structural Members	6
Table 5: Pre-cutters' Most Important Attributes for Engineered Structural Products	8
Table 6: Example of Choice Made for Wood Structural Members	10
Table 7: Builders' Relative Selection of Levels within Attributes for Wood Structural Members	11
Table 8: Pre-cutters' Relative Selection of Levels within Attributes for Wood Structural Members	13
Table 9: Builders' Market Share for Wood Structural Members based on Material	15
Table 10: Pre-cutters' Market Share for Wood Structural Members based on Material	16
Table 11: Pre-cutters' Market Share for Different Strengths for Hemlock.....	17
Table 12: Comparison of Ranking of Attributes for Builders and Pre-cutters.....	19

1 Introduction

This report presents the results of personal interviews and surveys conducted in Japan from March 1998 to June 1998. Each of the six product groups are presented in separate reports starting with Wood Furniture followed by Outdoor Furnishings, Interior Finish, Wood Structural Members, Engineered Structural Products and Building Systems. This section summarizes the results for Wood Structural Members. Table 1 shows which groups were surveyed for each product group.

Table 1: Product Groups and Interview Groups

Product Group	Types of People Interviewed
Building systems	Small builders & consumers
Engineered structural products	Small builders & pre-cutters
Wood structural members	Small builders & pre-cutters
Interior finish	Small builders & designers & consumers
Wood furniture	Consumers & designers
Outdoor furnishings & decking	Consumers

All reports follow the same format. First there is a summary of the general questions for the product category for each group interviewed. The survey questions are summarized with minimal commentary. Many of the questions will be clear from the text but to facilitate ease of use the questionnaire is shown in Appendix 1. Following this summary are the results of the conjoint (or trade-off) analysis for each group interviewed¹. This includes both simple trade-offs and trade-offs between two variables. The third set of results is a brief summary of the market share analysis. This section briefly examines the implications of changing attributes on market share of different products. The last section summarizes the most meaningful results and identifies opportunities for BC producers.

Information regarding Wood Structural Members was collected from two market segments: small house builders and pre-cutters. Information was collected in Japan from April-June 1998 through direct interviews of 170 builders and 135 pre-cutters located in one of the three major metropolitan areas (Tokyo, Osaka and Nagoya).

¹ For a full discussion of the methods used in this study please see the report titled "Introduction and Methodology for Wood Attribute Analysis."

2 Response to Questionnaire

2.1 Builders and House Construction²

The builders interviewed are the small house builders responsible for most of the wood house construction in Japan. Respondents were asked to identify the type and number of houses built in 1997. Table 2 shows the average number of houses per respondent by house type. This table should be read in the following manner: those builders who constructed post and beam houses built an average of 13.4 per year.

Table 2: Average Number of Houses Built by Construction Method

Type of House Construction	Avg. no. of houses/respondent
Post & Beam (traditional)	13.4
2 by 4	14.0
hybrid (mix of P&B and 2 by 4)	10.3
Prefabricated	23.2
Steel/Concrete	42.0

Results show that of the 3,720 houses built by respondents:

- ⇒ 56.4% are traditional post and beam,
- ⇒ 22.6% are 2 by 4,
- ⇒ 13.2% are hybrid houses (a mix of different construction styles),
- ⇒ 4.1% are steel or concrete, and
- ⇒ 3.7% are prefabricated houses.

There is a fairly even distribution of the size of house building firms represented with 19% building between 1-5 houses per year, 25% building between 6 and 10, 24% building 11-20 and 32% building over 20 houses annually.

Builders were also asked how many and what type of house they expected to build three years from now in order to establish perceived trends. The cumulative results are shown below:

- ⇒ traditional post and beam is expected to decline to 49.4%
- ⇒ 2 by 4 is expected to increase to 27.8%
- ⇒ hybrid houses are also expected to increase to 15.3%
- ⇒ steel and concrete are expected to increase to 5.5%
- ⇒ prefabricated are expected to decrease to 1.9%

² Results are presented in six separate reports based on product groups, thus some information is repeated. Such repetition will always be footnoted.

In order to find out how builders would consider the use of panels in the most common types of wood construction they were asked to rate their preference for a variety of building systems. The addition of exterior panels, particularly to traditional post and beam construction is under consideration for increased strength and stability in earthquake zones. Figure 1 shows that most small builders prefer to build as they always have without the use of panels.

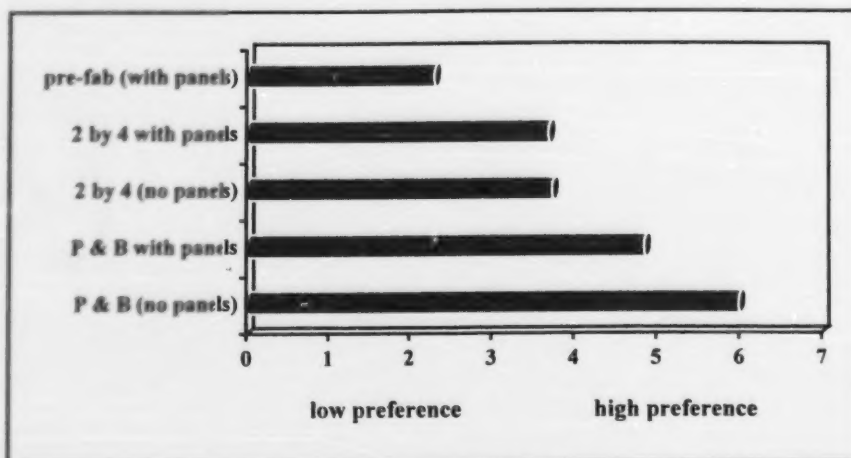


Figure 1: Preference for Construction Methods and the Use of Exterior Panels

There is a fairly even distribution of the size of house building firms represented with 19% building between 1-5 houses per year, 25% building between 6 and 10, 24% building 11-20 and 32% building over 20 houses annually.

2.2 Pre-cutters and House Construction³

The pre-cutters interviewed tended to build more than 20 houses per year. The exact breakdown is shown in Table 3.

Table 3: Size of Pre-cutters Interviewed

Number of Houses	% of 130 respondents
1-5 per year	3.8%
6-10 per year	6.9%
11-20 per year	20.0%
over 21 per year	69.2%

³ Results are presented in six separate reports based on product groups, thus some information is repeated. Such repetition will always be footnoted.

Respondents were asked to identify the type and number of houses built in 1997. The following table shows the average number of houses per respondent by house type. Results show that respondents built 77,799 houses in 1997.

The houses built in 1997 consisted of the following types:

- ⇒ 76.7% were traditional post and beam,
- ⇒ 15.9% were 2 by 4,
- ⇒ 1.7% were hybrid houses (a mix of post and beam and 2 by 4 including mixes of concrete basements and wood stories),
- ⇒ 2.9% were steel or concrete and
- ⇒ 2.8% were prefabricated houses.

Pre-cutters were also asked how many and what type of house they expected to build three years from now in order to establish perceived trends. They expect to triple the number of houses they build. Results by house type are shown below:

- ⇒ traditional post and beam is expected to decline by 1.7%,
- ⇒ 2 by 4 is expected to increase by 0.7%,
- ⇒ hybrid houses are also expected to increase by 3.0%,
- ⇒ steel and concrete are expected to decline by 1.8%,
- ⇒ prefabricated are expected to decline by 0.1%.

In order to find out how pre-cutters consider the use of panels in the most common types of wood construction, they were asked to rate their preference for a variety of building systems. The addition of exterior panels, particularly to traditional post and beam construction is under consideration for increased strength and stability in earthquake zones. Figure 2 below shows that pre-cutters are more open to the use of panels than small builders.

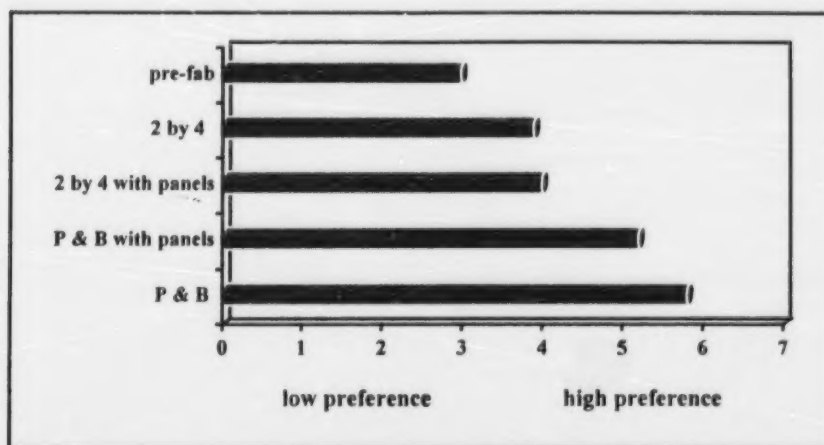


Figure 2: Preference for Construction Methods and the Use of Exterior Panels (Pre-cutters)

2.3 Health Issues⁴

To gauge concerns over health issues several question were asked regarding formaldehyde emissions as well as willingness to pay for lower emissions.

2.3.1 Builders and Health Issues

Over 95% of all respondents indicate that they are aware of the growing concern over formaldehyde emission in Japan and are interested in a panel with 1/50th of the current emission standard. Slightly less than half (44%) are willing to pay a small premium for a panel with much lower formaldehyde emissions than current standards.

2.3.2 Pre-cutters and Health Issues

Almost 97% of pre-cutters indicate that they were aware of the growing concern over formaldehyde emission in Japan and 85% are interested in a panel with 1/50th of the current emission standard. Slightly less than half (46%) were willing to pay a small premium for a panel with much lower formaldehyde emissions than current standards.

⁴ Results are presented in six separate reports based on product groups, thus some information is repeated. Such repetition will always be footnoted.

2.4 Answers to Questionnaire on Wood Structural Members

2.4.1 Builders

Eighty-five builders answered questions concerning wood structural members. They were asked to rank the five most important attributes in an engineered structural product. Table 4 summarizes the results and calculates the score by assigning 5 points for a first place ranking, 4 points for a second place ranking, 3 points for a third place ranking and so on with 0 points if the attribute was not ranked.

It is very interesting to note that the where builders purchase these members (distributor) and source of supply (defined as country of origin) are of little importance to builders.

- ⇒ The primary concerns are with strength, price, utility (how much of purchased material is usable in the final house) and species.
- ⇒ This product group is the only one where durability is of little importance but this may be a result of builders assuming all structural members are durable.
- ⇒ Colour and treatability are also of some importance.

Table 4: Builders' Most Important Attributes for Wood Structural Members

Attribute	Score
strength	316
price	247
utility	224
species	135
colour	119
treatability	110
finish	38
durability	17
weight	17
sizes	16
security of supply	15
source of supply	12
distributor	0

Respondents were also asked to indicate their preference for different types of wood structural material. The greatest preference is for dry solid wood members, followed closely by laminated lumber. Far behind is green solid wood. These results held true for both vertical and horizontal members as is clear from Figure 3.

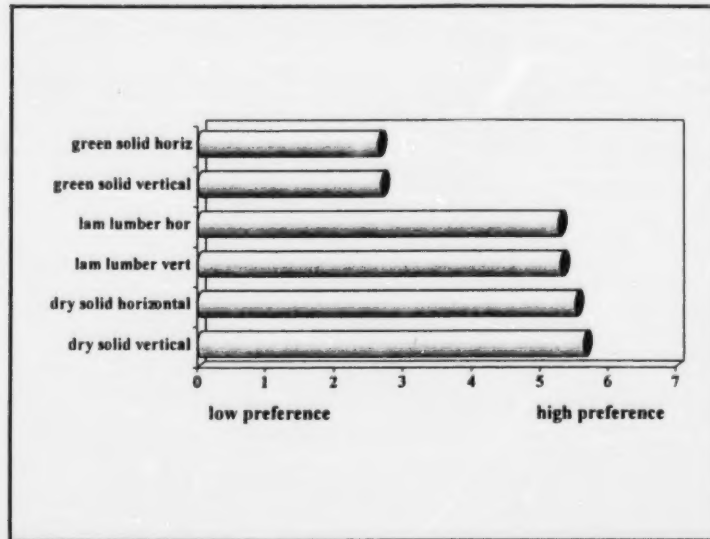


Figure 3: Builders Preference for Material in Wood Structural Members

Builders were also asked about their preference for connections. While there was a preference for a mix of connectors (metal and notching) that occurred in the factory this was not a strong preference. This is clear from Figure 4.

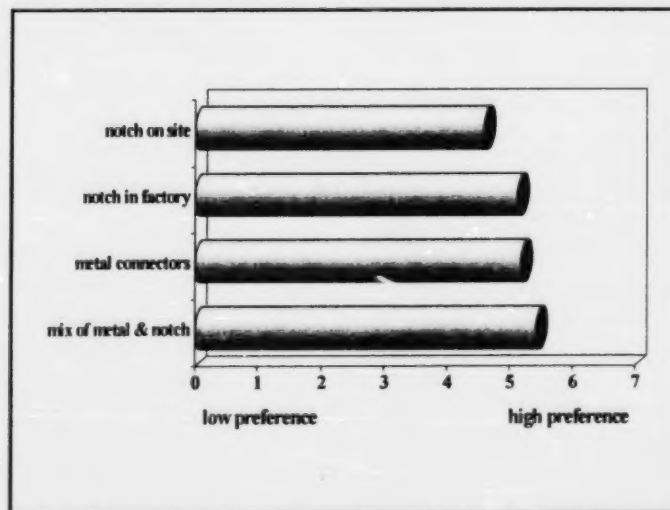


Figure 4: Builders' Preference for Type and Location of Connections

2.4.2 Pre-cutters

One hundred and thirty pre-cutters answered questions wood structural members. They were asked to rank the five most important attributes in an engineered structural product. Table 5 summarizes the results and calculates the score by assigning 5 points for a first place ranking, 4 points for a second place ranking, 3 points for a third place ranking and so on with 0 points if the attribute was not ranked.

It is very interesting to note that source of material and distributors are of little importance to pre-cutters as well as builders. Their primary concerns are strength, dry versus green, sizes, and security of supply, utility and durability. Pre-cutters are much more concerned about security of supply and sizes than builders. Builders are more concerned with colour, treatability and species than pre-cutters.

Table 5: Pre-cutters' Most Important Attributes for Engineered Structural Products

Attribute	Score	Builders' Rank
strength	449	1
dry versus green	304	N/A
sizes	252	7
security of supply	248	10
utility	226	3
durability	207	7
species	137	4
source of supply	39	11
distributor	33	12
treatability	28	6
colour	14	5
weight	12	9

Respondents were also asked to indicate their preference for different types of wood structural material. Similar to builders, the greatest preference was for dry solid wood members, followed closely by laminated lumber. Far behind was green solid wood. These results held true for both vertical and horizontal members as is clear from Figure 5.

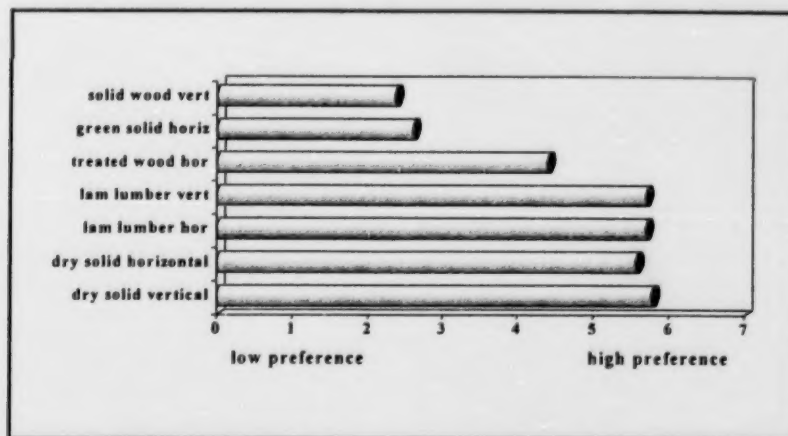


Figure 5: Pre-cutters' Preference for Material in Wood Structural Members

Pre-cutters were also asked about their preference for connections. While there is a preference for connectors that used notches this is not a strong preference. This is clear from Figure 6.

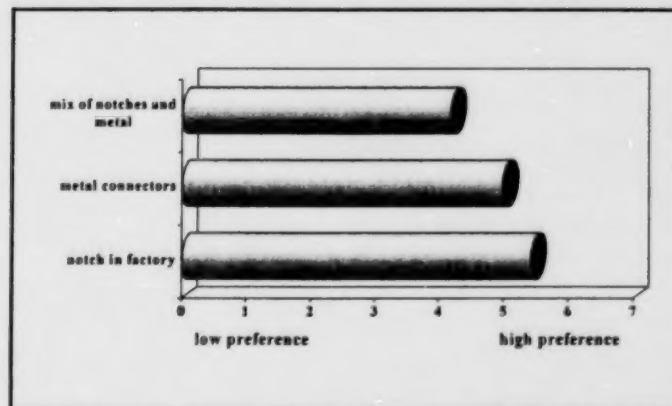


Figure 6: Pre-cutters' Preference for Type and Location of Connections

It is clear that both builders and pre-cutters want to keep some of the traditional task of notching when connecting structural members in houses rather than switch completely to new metal connectors.

3 Trade-Off Analysis: Wood Structural Members

For each product group designers and some consumers were asked to make choices between different types of products. Using trade-off analysis (or conjoint analysis) respondents are forced to trade off different attributes of a product. For example they would not be able to get all the best possible attributes at the lowest possible price but must make choices concerning how they will spend their limited resources. The methodology is complex and will not be discussed in this paper however an example of the type of choice they had to make is shown in Table 6. Each respondent had to make 20 such choices for wood structural members.

Table 6: Example of Choice Made for Wood Structural Members

Please select one of the 4 choices shown below.			
1	2	3	4
♦ current price ♦ Hemlock ♦ heavy weight ♦ traditional connections ♦ from local wholesaler ♦ slightly stronger than minimum building code	♦ 10% ↑ current price ♦ Scandinavian wood ♦ light weight ♦ new steel connectors ♦ from national supplier ♦ meets minimum building code	♦ 10% ↓ current price ♦ Japanese sugi ♦ average weight ♦ mix of traditional and steel ♦ from local retailer(s) ♦ meets minimum building code	None of the choices are suitable

There are several types of results that will be reported. First will be the relative proportion of respondents that chose a certain level for a specific attribute. These simple trade-offs are discussed briefly. Second will be how respondents made trade-offs among different attributes. This helps determine if respondents are willing to pay a premium for certain attributes. The third type of analysis reported is in the market share section and involves "what if" analysis. For example how much market share would a certain product achieve assuming our respondents are representative of all consumers or designers. Product attributes and their levels were selected with input from industry and government personnel both in BC and Japan. The last section summarizes key results and apparent opportunities.

The results of these attribute analyses will feed into the international trade analysis to assess BC's relative competitiveness in a global market for specific product groups. They will also provide direction for determining which species in BC can be best used to meet Japanese customer requirements and lead to a revision of both key results and opportunities.

3.1 Trade-Off Analysis for Builders

For each product group consumers were asked to make choices between different types of products. Using trade-off analysis (or conjoint analysis) respondents are forced to trade off different attributes of a product. For example they would not be able to get all the best possible attributes at the lowest possible price but must make choices concerning how they will spend their limited resources.

3.1.1 Simple Trade-Offs

Each respondent had to make a choice between 3 different types of wood structural members described by one level from each of the six attributes. They could also select none of the choices given. Respondents had to do this twenty times with different levels used for the same attributes. Levels and attributes were chosen with input from the project steering committee and additional input from BC representatives in Japan. They are shown in Table 7 as well as the proportion of times a certain level within an attribute was selected. The statistical software used for conjoint analysis also completes statistical tests to ensure that differences are significant and not due to random chance.⁵ Because there are over 2,000 choices made by over 125 builders even a small difference can have meaning.

The way this table can be read follows:

- 40.9% of the time builders selected a price that was 10% less than current prices,
- 32.3% of the time builders selected current prices.

Because there are more than 2,000 selections the impact from the other attributes is minimized.

Table 7: Builders' Relative Selection of Levels within Attributes for Wood Structural Members

Attribute Level	% of time selected	Attribute Level	% of time selected
Price		Distribution	
10% less than current prices	40.9	local retailer	20.7
current prices	32.3	local wholesaler	22.4
10% more than current prices	18.5	local pre-cutter	21.6
20% more than current prices	8.2	national supplier	16.1
		many sources	19.3
Species		Strength	
Hemlock	23.0	meets code	26.9
Scandinavian white wood	21.7	slightly stronger than code	35.4
Japanese sugi	34.9	much stronger than code	37.8
SPF	20.5		
Weight			
average	15.0		
light	35.6		
heavy	31.0		
variable	18.4		

⁵ Within each attribute there was a significant difference between levels tested using a Chi Square at $\alpha = .01$

Price The lower the price the more often the product is selected. The very low percent that select a 20% premium indicates that while premiums are available they are relatively small. For wood structural members, low price is the strongest selling point for any product.

Species Japanese sugi is the most preferred species selected by over two thirds of respondents. Hemlock is the second selection followed closely by Scandinavian white wood and SPF. Species is considered a fairly important attribute. Given the relatively low market share of SPF these results indicate room for growth for SPF and problems for Hemlock given that its current market share is greater than these results would indicate.

Weight About a third of the builders prefer members that are lighter in weight than average and another third prefer members heavier than average. This may be due to builders' assumption that weight is related to strength. Builders do not consider weight, on its own, a very important attribute.

Distribution Almost three quarters of respondents prefer to purchase from local suppliers whether they are retailers, wholesalers or pre-cutters. Only 16% selected national suppliers as their distribution source. However it must be noted that distribution source is not considered a very important product attribute and ranked very low (see Table 3).

Strength Strength is the most important attribute of wood structural members for builders. Almost three-quarters prefer members that either slightly or greatly exceed building codes. However over a quarter selected members which just met minimum codes. This is a clear indication that builders want stronger structural members.

3.1.2 Two Way Trade-Offs: Builders

Results also show how two different attributes interact with each other. People making purchasing decisions do not rely on a single product attribute in making their selection but on many attributes and how they interact with each other.

Only certain two-way trade offs are presented. Those interactions omitted are for the following reasons: 1) they provide little useful information, 2) there is little difference between different combinations or 3) statistical analysis indicated unreliable results. The results are summarized without presenting the tables or details of analysis for brevity. For wood structural members there were few significant interactions partly due to the dominance of price in the purchasing decisions of small builders for these items.

Interaction of Price and Distribution

- ★ Builders expect lower prices to be available from local suppliers rather than national distributors. Wholesalers are expected to offer lower prices than local retailers do.
- ★ Local retailers are expected to supply higher priced items most often followed by local pre-cutters.
- ★ At current prices all distributors rank about equally.

Interaction between Species and Weight

- ★ Hemlock is considered a heavy wood.
- ★ Japanese sugi and European white woods are considered both heavy and light (probably depending on level of dryness and whether they were laminated or not).

Other Interaction Observations⁶

- There is a willingness to pay a premium for strength but it did not increase from slightly stronger than code to much stronger than code; that is some builders are willing to pay a premium for strength but not a 20% premium and not for a much stronger product.
- Builders prefer to get non-Japanese species from local suppliers. They have little preference regarding source of supply for Japanese sugi, either national distributors or local suppliers.
- Builders consider the following species to be slightly stronger than code (in rank order) are Japanese sugi, Scandinavian white wood, Hemlock and last, SPF.
- The species builders consider if the member is to be much stronger than code are similar to the list above except Hemlock ranks second and European white wood ranks third.

3.2 Trade-Off Analysis for Pre-cutters**3.2.1 Simple Trade-Offs**

One hundred and twenty five pre-cutters provided information for this analysis and the attributes and results are shown in Table 8. These are similar to builders' attributes and levels except that source of material is replaced by variety of sizes.

Table 8: Pre-cutters' Relative Selection of Levels within Attributes for Wood Structural Members

Attribute Level	% of time selected	Attribute Level	% of time selected
Price		Sizes	
10% less than current prices	38.6	specified lengths, widths and depths	33.4
current prices	33.6	specified widths & depth	34.3
10% more than current prices	19.1	specified depth only	32.3
20% more than current prices	8.7		
Species		Strength	
Hemlock	19.8	meets code	30.1
Scandinavian white wood	24.7	slightly stronger than code	32.6
Japanese sugi	30.4	much stronger than code	37.3
SPF	25.2		
Weight			
average	7.8		
light	34.4		
heavy	34.7		
variable	23.1		

⁶ These results do not have strong statistical support.

Price Similar to builders, pre-cutters are reluctant to pay premiums and very few selected 20% premiums regardless of the attributes. Pre-cutters (and builders) are very price sensitive.

Species Pre-cutters' selected Japanese sugi most frequently followed by SPF, Scandinavian white wood and lastly Hemlock. Hemlock is selected less than 20% of the time. This differs dramatically from builders who select Hemlock as their second choice.

Weight Results are similar as to those from builders.

Sizes There is no statistical difference between different available sizes. Pre-cutters can remanufacture their purchases to desired sizes and the relative importance of utility suggests that there is little value to pre-cutters by purchasing pre-sized components.

Strength According to the survey results, this is the most important attribute. Almost three-quarters of the pre-cutters prefer members that either slightly or greatly exceed building codes. However over a quarter select members, which just met minimum codes. Both builders and pre-cutters want stronger structural members but are not necessarily dissatisfied with strength that just meets minimum building code.

3.2.2 Two Way Trade-Offs

Interaction between Price and Species

- ⊛ As price increases the proportion that select Hemlock and Scandinavian white wood declines much more quickly than for SPF or Japanese sugi.
- ◆ this indicates some potential for a premium SPF product for pre-cutters.
- ⊛ SPF maintains its rank as second most favoured wood at all price ranges but this may be due to the strong preference from pre-cutters for dry material.

Interaction between Price and Weight

- ⊛ There is little indication that pre-cutters are willing to pay any premium for wood structural members that weigh less.

Interaction between Species and Strength

- ⊛ As strength requirements increase, pre-cutters select Japanese sugi much less frequently although it still remained the species of choice.
- ⊛ Pre-cutter select SPF most frequently as the strength requirement increases.

Other Interaction Observations⁷

- ⊛ At all weights pre-cutters prefer multiple lengths
- ⊛ There are very few significant interactions for pre-cutters with price. The ranked attributes provide the most useful information.

⁷ These results do not have strong statistical support.

4 Market Simulation

The software enables analysis of market share potential and changes for different products with various levels of attributes. This allows calculation of potential market for wood structural members. While not all possible combinations will be calculated or shown the potential for wood structural members will be explored by presenting several scenarios. This analysis shows the results for builders and pre-cutters separately since the distribution attribute for builders is replaced by the size attribute for pre-cutter.

4.1 Builders and Wood Structural Members

Results from the first market share run for wood structural members for builders are shown in Table 9.

Table 9: Builders' Market Share for Wood Structural Members based on Material

Hemlock	Scandinavian white wood	Japanese sugi	SPF	none of these
current prices	current prices	current prices	current prices	
average weight	average weight	average weight	average weight	
many sources of distribution	many sources of distribution	many sources of distribution	many sources of distribution	
meets code strength	meets code strength	meets code strength	meets code strength	
7.9%	7.5%	14.5%	6.9%	63.2%

These results indicate that builders are dissatisfied with the current source of supply for wood structural members. There is almost a two to one preference for Japanese sugi over any other species.

When the weights are adjusted to better reflect actual market conditions, the market shares change dramatically. Weights are assigned with Hemlock being heavy, Scandinavian white woods as light, Japanese sugi as average and SPF as light. Results shown are similar for local retailers, wholesalers and pre-cutters as the distribution source of material.

⇒ Hemlock	20.3%
⇒ Scandinavian white wood	20.5%
⇒ Japanese sugi	10.7%
⇒ SPF	18.7%
⇒ None of the above	29.9%

These results indicate that both Scandinavian white wood and SPF still could increase market share as structural wood members in Japanese construction. For national distributors the ratio is similar with more selecting none of these choices. It is clear that with the weight differential Scandinavian white wood has additional room to capture market share from traditional products assuming no price differential.

When prices for Scandinavian white wood are increased by 10% their market share declined by almost 50% to 10.4% with SPF picking up the vast majority and increasing to over 19%.

If Hemlock were to shift from a heavy weight to light, similar to SPF and Scandinavian white wood, then its market share would increase to 23.4% surpassing Japanese sugi (12.6%). Share would also decline for Scandinavian white wood to 14.4% while SPF would remain stable at 20.3%.

- ⊗ Decreasing the weight increases the market share for Hemlock without detracting from the share for SPF. However pre-cutters might be associating light weight with kiln dried members.

By increasing the strength for Hemlock from "meets building code requirements" to "slightly above building code requirements" the share for Hemlock soars to over 35%. Once again the share for SPF is least affected and declines to 18.3% while Scandinavian white wood declines to 12.4% and sugi declines to 10.9%. Given the new strength properties of Canadian Hemlock, promotion of the strength characteristics seems a suitable strategy assuming that this strength truly does exist and can be proven to a skeptical Japanese builder. If the strength of SPF is also increased to slightly above code requirements, the market share distribution changes to Hemlock 28.6%, SPF 22.1%, Scandinavian white wood 13.1%, sugi 11.5%, and no wood structural member 22.1%.

- ⊗ Increasing strength slightly impacts share dramatically.

Generally there is little commitment to species among builders when selecting wood structural members. Price and strength are the dominant consideration and builders will switch species based on these two criteria alone.

4.2 Pre-cutters and Wood Structural Members

Table 10 shows results from the first market share run for wood structural members for pre-cutters.

Table 10: Pre-cutters' Market Share for Wood Structural Members based on Material

Hemlock	Scandinavian white wood	Japanese sugi	SPF	none of these
current prices	current prices	current prices	current prices	
heavy weight	light weight	average weight	light weight	
local wholesaler	local wholesaler	local wholesaler	local wholesaler	
meets code strength	meets code strength	meets code strength	meets code strength	
17.7%	20.5%	4.2%	21.3%	36.3%

Japanese pre-cutters favour kiln-dried wood with both SPF and Scandinavian white wood capturing over 20% market share each. Hemlock is not far behind at 17.7% while Japanese sugi lags far behind at 4.2%. Given the traditional price discount for sugi these numbers are not surprising since prices during the survey period showed little discount for sugi over Hemlock.

If the strength is increased for Canadian species to "slightly stronger than code" market shares change as shown in Table 11.

Table 11: Pre-cutters' Market Share for Different Strengths for Hemlock

	Hemlock slightly stronger (% of market share)	Hemlock and SPF slightly stronger (% of market share)
Hemlock	23.4	19.7
Scandinavian white wood	19.6	21.2
Japanese sugi	4.1	4.1
SPF	20.4	24.8
none of the above	32.4	3.02

The number of pre-cutters committed to products other than the four listed (most likely laminated posts and engineered structural products) remained relatively constant at over 25% indicating more radical changes are needed than those considered in the attribute list (e.g. kiln drying Hemlock) to regain market share from laminated products. It also indicates that once pre-cutters switch to laminated products it will be very difficult to have them switch back.

4.2 Further Market Share Analysis

Numerous scenarios are possible in market share analysis and not all possibilities are shown in this report. Should BC producers desire additional analysis please contact the authors.

5 Results

5.1 Summary of Key Results

- ★ Over the next 3 years small house builders expect:
 - ◆ traditional post and beam construction to decline dramatically (49%),
 - ◆ 2 by 4 to increase substantially (28%),
 - ◆ hybrid houses to increase dramatically (154%),
 - ◆ steel and concrete to increase slightly (<6%), and
 - ◆ prefabricated houses to decline slightly.
- ★ Over the next 3 years pre-cutters expect:
 - ◆ traditional post and beam construction to decline slightly (2%),
 - ◆ 2 by 4 to increase slightly (1%),
 - ◆ hybrid houses to increase (3%) and
 - ◆ steel, concrete and prefabricated houses to decrease slightly (<2%).
- ★ Builders and pre-cutters prefer to build post and beam houses in the traditional manner even if paneling is required.
- ★ Both builders and pre-cutters are very aware of the growing concern with formaldehyde emissions. Slightly less than half of each group is willing to pay a small premium for a panel with emission less than current standards allow.
- ★ Builders and pre-cutters prefer dry solid wood followed by engineered wood products, and lastly, green solid wood for both vertical and horizontal member
 - ◆ Green wood ranks very low in for both vertical and horizontal members for both builders and pre-cutters.
- ★ There are distinct differences between builders and pre-cutters in considering what attributes are most important. A comparison of ranking is shown in Table 12.
 - ◆ Builders and pre-cutters consider strength and price as the two most important (pre-cutters data from trade-off analysis).
 - ◆ Pre-cutters rank utility higher than builders while builders rank species higher than pre-cutters.
 - ◆ Sizes and whether the material is dry or green are much more important to pre-cutters than builders.
 - ◆ Neither group consider country of origin or distributor as very important attributes.

Table 12: Comparison of Ranking of Attributes for Builders and Pre-cutters

	Builders' Rank	Pre-cutters' Rank
strength	1	1
price	2	N/A
utility	3	5
species	4	7
colour	5	11
treatability	6	10
finish	7	N/A
dry versus green	N/A	2
sizes	10	3
durability	8	6

- ⊛ Builders prefer a mix of metal connectors and notches, followed by metal connectors and notching in the factory with notching on site the least favoured connection method.
- ⊛ Pre-cutters are very different than builders and prefer structural members to be notched in the factory followed by metal connectors and lastly a mix of metal and notches.
- ⊛ Both groups are very price sensitive with resistance to paying premiums for most added attributes.
- ⊛ Both groups prefer Japanese sugi. However builders select Hemlock second closely followed by Scandinavian white wood and SPF. This indicates that European white wood has more market share to capture and could become equivalent to Hemlock in sales to builders.
 - ◆ Pre-cutters select Scandinavian white wood as their second choice followed by SPF and lastly Hemlock (less than 20% of the time).
- ⊛ Strength is the highest ranked attribute for both groups.
 - ◆ Preference by both builders and pre-cutters is for slight strength increases relative to current codes but few are willing to pay a premium for increased strength.
- ⊛ Size availability is irrelevant to both groups.
- ⊛ Both groups are very price sensitive with no indication of willingness to pay premiums for any attribute.
 - ◆ A small premium is available for health related attributes.
 - ◆ SPF has the best chance of attaining a price premium.
 - ◆ Hemlock and Scandinavian white wood has the least chance of attaining a price premium.

5.2 Opportunities

➤ There are two clear opportunities:

- ◆ The first is to develop a premium SPF product for structural members in traditional post and beam construction. This would not capture a large price premium but could capture market share as long as increased costs did not prohibit its development.
- ◆ The second is to develop a dry solid wood structural member from Hemlock. This is not a new idea but it must be accomplished without requiring substantial price premiums.

Appendix 1: Wood Structural Members Survey Questions for Builders and Pre-Cutters

General Questions for Builders

1. Please indicate how many houses you build in a year?

1-5 _____
 6-10 _____
 10-20 _____
 21 and over _____

2. Please indicate what type of houses you built in 1997.

Type of House	Number	% of total
traditional (Post and beam)	_____	_____
2 by 4 (platform frame)	_____	_____
hybrid (mix of post & beam and 2 by 4)	_____	_____
pre-fabricated	_____	_____
steel or concrete	_____	_____
		100%

3. Please indicate what type of houses you expect to build three years from now.

Type of House	Number	% of total
traditional (Post and beam)	_____	_____
2 by 4 (platform frame)	_____	_____
hybrid (mix of post & beam and 2 by 4)	_____	_____
pre-fabricated	_____	_____
steel or concrete	_____	_____
		100%

4. Which type of construction method would you prefer?

	Low preference					High preference	
traditional	1	2	3	4	5	6	7
traditional (panel frame)	1	2	3	4	5	6	7
2X4	1	2	3	4	5	6	7
2X4 (panel method)	1	2	3	4	5	6	7
pre-fabricated	1	2	3	4	5	6	7

5. Are you aware of the growing concern over formaldehyde emissions in Japanese homes?

YES _____ NO _____

6. Would you be interested in a panel with 1/50th of the formaldehyde emission levels of government standards?

YES _____ NO _____

6. Would you be prepared to pay a small premium for such a panel?

YES _____ NO _____

Questions for Builders on Wood Structural Members

7. Please rank the five most important of the following product attributes with number 1 being the most important.

- _____ strength (earthquake preparedness)
- _____ source of supply (country of origin)
- _____ species
- _____ weight
- _____ finish (e.g. dried and planed versus green and planed)
- _____ sizes
- _____ colour
- _____ security of supply
- _____ utility (how much of purchased material is usable in the final house)
- _____ durability (how long the member will last)
- _____ distributor (where you purchase the product)
- _____ price
- _____ ease of treatability

8. Please indicate the relative preference for the wood structural material of your preferred house.

	Low preference					High preference	
green solid wood for horizontal members	1	2	3	4	5	6	7
dry solid wood for horizontal members	1	2	3	4	5	6	7
laminated lumber for horizontal members	1	2	3	4	5	6	7
green solid wood for vertical members	1	2	3	4	5	6	7
dry solid wood for vertical members	1	2	3	4	5	6	7
laminated lumber for vertical members	1	2	3	4	5	6	7

9. Please indicate how you prefer to connect your wood structural members?

	Low preference					High preference	
traditional notching and nails on site	1	2	3	4	5	6	7
same as above but in factory (pre-cut)	1	2	3	4	5	6	7
metal connectors and joist hangers	1	2	3	4	5	6	7
a mix of notches, nails & connectors	1	2	3	4	5	6	7

General Questions for Pre-cutters

1. Please indicate how many houses you supply material for in a month?

1-5 _____
 6-10 _____
 10-20 _____
 21 and over _____

2. Please indicate what type of houses you supplied material for in 1997.

Type of House	Number	% of total
Post and beam (traditional)	_____	_____
2 by 4 (platform frame)	_____	_____
hybrid (mix of post & beam and 2 by 4)	_____	_____
pre-fabricated	_____	_____
steel or concrete	_____	_____
		100%

3. Please indicate what type of houses you expect to supply material for three years from now.

Type of House	Number	% of total
Post and beam (traditional)	_____	_____
2 by 4 (platform frame)	_____	_____
hybrid (mix of post & beam and 2 by 4)	_____	_____
pre-fabricated	_____	_____
steel or concrete	_____	_____
		100%

4. Which type of construction method would you prefer to supply material for?

	Low preference					High preference	
traditional	1	2	3	4	5	6	7
traditional (panel frame)	1	2	3	4	5	6	7
2X4	1	2	3	4	5	6	7
2X4 (panel)	1	2	3	4	5	6	7
pre-fabricated	1	2	3	4	5	6	7

5. Are you aware of the growing concern over formaldehyde emissions in Japanese homes?

YES _____ NO _____

6. Would you be interested in a panel with 1/50th of the formaldehyde emission levels of government standards?

YES _____ NO _____

7. Would you be prepared to pay a small premium for such a panel?

YES _____ NO _____

8. Do you offer treating services?

yes _____ no _____

Questions for Pre-cutters on Wood Structural Members

9. Please rank the five most important of the following product attributes with number 1 being the most important.

- _____ strength (earthquake preparedness)
- _____ source of supply (country of origin)
- _____ species
- _____ weight
- _____ sizes
- _____ colour
- _____ security of supply
- _____ utility (how much of purchased material is usable in the final house)
- _____ durability (how long the member will last)
- _____ distributor (where you purchase the product)
- _____ ease of treatability of building material
- _____ dry vs. green wood components

10. Please indicate the relative preference for the wood structural material of your preferred house.

	Low preference					High preference	
green solid wood for horizontal members	1	2	3	4	5	6	7
dry solid wood for horizontal members	1	2	3	4	5	6	7
laminated lumber for horizontal members	1	2	3	4	5	6	7
green solid wood for vertical members	1	2	3	4	5	6	7
dry solid wood for vertical members	1	2	3	4	5	6	7
laminated lumber for vertical members	1	2	3	4	5	6	7
treated wood horizontally used	1	2	3	4	5	6	7

11. Please indicate how you prefer to connect your wood structural members?

	Low preference					High preference	
traditional notching in factory	1	2	3	4	5	6	7
metal connectors and joist hangers	1	2	3	4	5	6	7
a mix of notches, nails & connectors	1	2	3	4	5	6	7